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ABSTRACT

This paper describes the use of webcasting technology in a personnel preparation program for rural special education practitioners. Emerging technologies offer promising solutions to the challenges of providing accessible and appropriate training to rural special educators. Web-based instruction is especially appropriate for on-the-job training of practitioners because it allows learners to work at home or school to process materials at their own pace, interact with the instructor and other practitioners as needed, and receive individual feedback as they apply information to real-world settings. Since 1990, a West Virginia University graduate-level program leading to teaching certification and a master's degree in a special education specialty has been delivered via satellite transmission to individuals at sites throughout West Virginia and Appalachia. In 2001, the program received a grant to test the feasibility of using videostreaming technology to transmit the live satellite class over the Internet to individuals without satellite access. A system was developed to offer live Web simulcasts as well as rebroadcasts (archived sessions available on demand). Computer software and hardware are described for two trials of the system using Quicktime and Real Media streaming formats. The project has been a success, allowing participation of students in remote rural sites, other states, and other countries, as well as student review of archived materials as needed. (SV)

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Webcasting: A New Technology for Training Special Educators in Rural Areas

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WEBCASTING: A NEW TECHNOLOGY FOR TRAINING SPECIAL EDUCATORS IN RURAL AREAS

Abstract

This paper describes the use of webcasting technology (both simulcasts in real time and re-broadcasts on demand) in a personnel preparation program for practitioners working in early intervention, special education, or adult disability services in a rural state. Technology-mediated distance education is a widely used method of delivering preservice and inservice preparation programs to rural schools and emerging technologies such as video streaming may have promise for improving program accessibility and enhancing program quality. The distance education program in Severe/Multiple Disabilities and Early Intervention Special Education at West Virginia University has successfully utilized webcasting technology to deliver a graduate certification and degree program to practicing but uncertified special educators working in rural areas of the United States as well as in several other locations around the world.

The paper will accomplish four (4) objectives:

1. to describe the application of webcasting technology to programs for special educators working in rural areas;
2. to illustrate hardware and software needed to create, deliver, and receive webcasts;
3. to present initial evaluation data on participant performance and perceptions;
4. to discuss the pros and cons of using webcasting for preservice and inservice training.

The procedures and outcomes described in this project may be useful for college and university faculty and/or state and local school personnel who are currently using or may be considering web-based training options in rural areas.

Introduction to the Webcasting Project

Effective and efficient personnel preparation programs at the preservice and inservice level are essential in insuring a free appropriate public education for all children, but especially in rural areas, where staff recruitment, retention, and development are critical issues. Emerging technologies offer promising solutions to the challenges colleges and universities as well as state and local education agencies face in providing accessible and appropriate training to rural special educators. The webcasting technology described in this session is an innovative approach to helping special education personnel acquire knowledge and skills needed to deliver best practices in rural schools and to acquiring full credentials for licensure/certification in special education or disability services.

Background of the Webcasting Project

Technology-mediated distance education is rapidly becoming widely used for personnel preparation in special education at both the preservice and inservice levels. Today's telecommunications technologies allow quality programs to be delivered to many individuals effectively and efficiently without the barriers of time and space (Howard et al., 1992). A number of universities are now using distance education to address critical personnel shortages, especially in low incidence disabilities in and rural areas (Ludlow, 1998). Although web-based instruction is just now being explored for its distance education potential, it has many promising applications in teacher education in special education. Web-based instruction is especially appropriate for on-the-job training of practitioners because it allows learners to work at home or school to process materials at their own pace, to interact with the instructor and other practitioners as needed, and to receive individually designed feedback as they apply information to real world settings (Kelker et al. 1992; Kendal, 1992). Recent availability of streaming media and higher bandwidth connections now permit the delivery of live interactive sessions on the Internet in real time.

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Teacher education programs can harness the potential of this exciting new technology to develop more accessible, lower cost distance education programs.

Description of the Webcasting Project

West Virginia University (WVU) has offered a distance education program at the graduate level leading to teaching certification and a Master's degree in either Severe/Multiple Disabilities or Early Intervention/Early Childhood Special Education since 1990. All courses in these programs have been offered via unencrypted C-band satellite transmission to individuals attending at colleges, schools, public libraries, and other public sites throughout West Virginia and the surrounding Appalachian region. However, frequent requests by individuals living in more remote rural areas in this region, in other parts of the country without satellite access, or in international locations outside the satellite footprint (signal distribution) prompted the program coordinator to consider how the program could accommodate these prospective students and expand its service area.

In Spring 2001, the program was awarded a small grant (about $15,000) from the WVU Division of Extended Learning to test the feasibility of using videostreaming technology to transmit the live satellite class sessions over the Internet to individuals without satellite access. In collaboration with the program's instructional media producer, the program coordinator developed a system to offer web simulcasts (live class sessions streamed over the web at the same time as satellite broadcasts) as well as re-broadcasts (archived class sessions streamed over the web on demand at any time).

Trial One: Quicktime Streaming

The initial trial of the webcasting project made use of Apple's Quicktime streaming format. Quicktime has the advantage of cross-platform compatibility and high quality images with "skip protection" technology (Waggoner, 2001). The Quicktime tools are the least expensive and easiest to use for videostreaming (Sauer, 2001). The program coordinator and producer tested the system to insure that all components would be up and running prior to the start of the 2000-2001 academic year. In Fall 2000, Quicktime webcasts (both simulcasts and re-broadcasts) were offered in conjunction with two progam courses. A live webcast was streamed during each two hour class session for the 15 weeks of the semester and an archived copy of each class session was also made available on the server. Access to simulcasts was limited to several individuals living outside West Virginia in other states and re-broadcasts were limited to a handful of individuals living overseas.

The program coordinator purchased an Apple OSX streaming server equipped with a 733 Mhx processor and 256 MB RAM, Sorensen Broadcaster streaming software, and enough Sony digital videotapes to record all class sessions for one semester. She also secured use of Apple Macintosh G3 Powerbook with 400 Mhz processor speed and 250 MB RAM to send the signal from the studio to the server and installed an existing copy of Quicktime 4.0 Pro to convert the archived files to a web-friendly format. The media producer obtained a static Internet protocol (IP) address, set up the streaming server, installed the Broadcaster software on the Powerbook 5300 for easy transport to and from the broadcast studio during classes, and created a special icon within the WebCT course management system software where students could link to the live and archived streams. Students were told to insure that their computer had audio and video cards and to download and install a free copy of Apple Quicktime Player 4.0 in their browser's plug-ins folder to view the webcasts.

At the broadcast studio, the production switcher was connected to the Powerbook with a cable and to another desktop computer within the studio so that the producer could monitor the live streams. The Broadcaster software was used to convert the output from the studio switcher on the fly into a Quicktime audio and video stream using the Real Time Streaming Protocol (RTSP). A single stream was sent to the program server at another location where students could access the class session via a link within the university's WebCT course management software. At the same time, the digital video tapes were used in an existing Sony DVX 1000 digital camcorder to record each class session for use in the archived re-broadcasts. During the class session, the instructor monitored the simulcast with a desktop computer. After each broadcast, the Quicktime Pro software on a desktop computer was used to convert the archived tapes (by means of "hinting") for delivery on demand. These archived files were then uploaded to the program server so that students could access the re-broadcasts on demand at any time throughout the course.

In this trial, web simulcasts were made available to students at three sites (in Florida, Virginia, and New York) and re-broadcasts were made available to three students at two different sites on Saipan, and island in the South Pacific. The instructor and media producer worked with these students to identify and solve problems and fine-tune the system. They concluded that Apple Quicktime streaming provided high quality video but only a single stream, which was less effective with some phone modem. The Quicktime webcasts offered excellent results with cable modem or fiber line internet connections, but only fair results with 56K telephone modem access; the international sites were able to get good audio signal but no video signal.

Trial Two: Real Media Streaming

The second trial made use of RealNetworks Real Media streaming format. RealMedua streaming has the advantage of producing several streams at different access rates or using patented Surestream technology to offer a single stream that automatically adjusts to the user's access rate (Waggoner, 2001). The RealMedia tools are more expensive bur offer greater flexibility (Sauer, 2001). In order to insure greater access to the webcasts, the program coordinator and media producer investigated other options for transmitting live and archived video streams. During Fall 2000, they collaborated with technical personnel at the West Virginia Education Network (EDNET) in Institute, West Virginia to explore the uses of Real Media Producer software for transmitting live webcasts and recording archived webcasts.

EDNET personnel set up a rack-mounted Athalon ATX computer with 500 Mhz processor and 64 MB RAM to run the encoder software. They purchased an annual 100 stream Real Producer Pro license from RealNetworks to encode the streams on the fly from the live satellite broadcasts and used a Viewcast Osprey 1 internal PCI video capture card to convert the analog signal to digital signal. They purchased a Microsoft Windows NT 4.0 server with a 700 Mhz dual processor and 86 MB RAM plus a 10 GB drive to store and serve the live and archived video streams. Students were told to insure that their computer had audio and video cards and to download and install a free copy of Real Player Basic 8.0 in their browser's plug-ins folder to view the webcasts.

The program coordinator, the media producer, and EDNET personnel tested the system to insure that all components would be up and running prior to the start of the subsequent semester. In Spring 2001, RealMedia webcasts (both simulcasts and re-broadcasts) were offered in conjunction with two additional program courses. A live webcast was streamed from EDNET during each two hour class session for the 15 weeks of the semester and an archived copy of each class session was also made available on the EDNET server. The instructor and students both logged onto the web course and accessed the link to the webcasts, and the instructor also monitored the live webcasts from the studio during each class session.

In this trial, access to simulcasts was extended (on a limited basis) to a handful of individuals living within West Virginia (in addition to those living outside the state) for a total of eight students and access to re-broadcasts was extended to some other students in the course (as well as individuals living overseas) for a total of 18 students. The instructor and media producer worked with these students to identify and solve problems and fine-tune the system. They concluded that Real Media streaming provided lower quality video but the Surestream technology allowed the stream to be adjusted to the user's Internet access, which made the webcasts more accesible via telephone modem. The Real Media webcasts offered excellent results with cable modem or fiber line internet connections, and good results with 56K telephone modem access; the international sites were able to get good audio signal and fair video signal.

Outcomes of the Webcasting Project

The WVU Webcasting Project has been a success from both the institution's perspective and the students' perspective. The availability of web simulcasts has enabled students living in states other than West Virginia to participate in the certification and degree program; to date, 10 students have enrolled in courses from states such as California, Colorado, Florida, Indiana, New Jersey, New York, North Carolina, and Virginia. The simulcasts are also used frequently by students in West Virginia when they cannot access the satellite broadcasts due to technical problems at their site or if they must be absent due to illness or bad weather. The availability of re-broadcasts has allowed six individuals living in international areas to join the program; four students have enrolled from Saipan, an island in the South Pacific and two have enrolled from Iceland. The program has received additional inquiries from individuals in Belize, Japan, Saudi Arabia, and Scotland. The re-broadcasts are also used often by all students to

review content or activities from the broadcast/webcast sessions as needed throughout the course. Beginning with the Spring 2002 semester, program staff no longer make videotape copies of class sessions for students who miss class because they can access the webcasts online more quickly and with less effort. The program coordinator has made the decision to stay with the Real Media video streaming for the time being, because it is more easily accessed by a wider range of equipment, even though the overall quality of the video image is not as good as the Quicktime streaming.

Webcasting is now a permanent component of the distance education program in Severe/Multiple Disabilities at WVU and it may also be appropriate for other personnel preparation programs in rural areas. The advantages of webcasting include enhanced access to training programs in even the most remote rural areas; reduction in the cost and effort associated with duplicating videotapes copies of class sessions; and provision of opportunity for national and even international outreach. The disadvantages of webcasting are the lower quality of the video image online compared with high quality images via satellite; the bandwidth limitations in some areas of the country or the world; and the continuing technical difficulties with the streaming server and the users' computers. Nevertheless, webcasting represents a viable option for delivering instruction in real and/or delayed time as well as an acceptable balance between program quality and accessibility.

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